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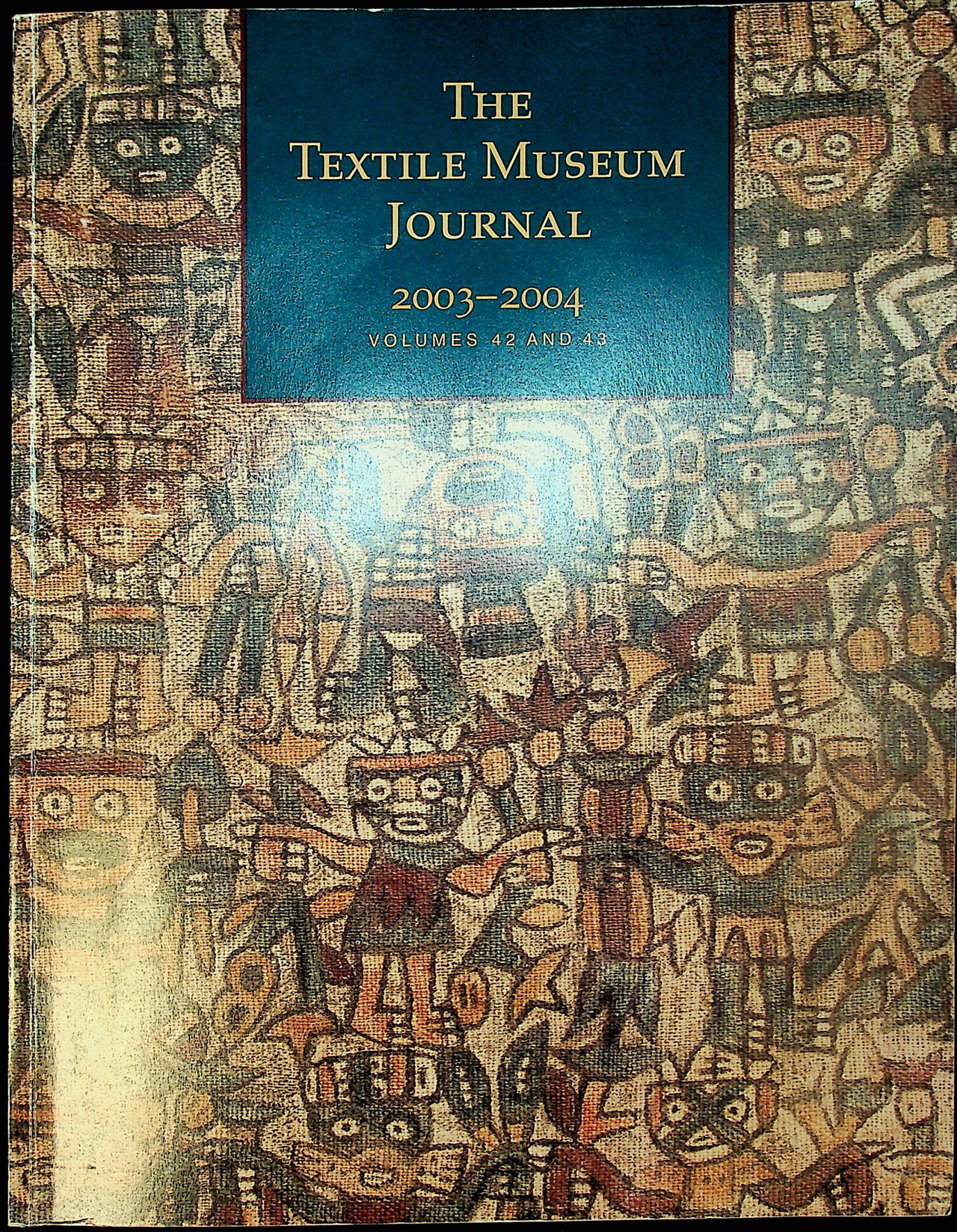

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Front and back covers: Skirt panel from a woman's dress (detail, warp direction horizontal), overall size: 82 x 158.5 cm. The Textile Museum 1964.31.2, museum purchase. See Mary Frame, What the Women Were Wearing: A Deposit of Early Nasca Dresses and Shawls from Cahuachi, Peru, pp. 13–53, fig. 24.

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Fig. 1. *Furcraea andina*, Cotopaxi province. Slide by Ann Pollard Rowe, 1988.

Fig. 2. *Agave americana*, Cotopaxi province. Slide by Ann Pollard Rowe, 1988.

Leaf Fibers in Highland Ecuador

Laura M. Miller, Mrill Ingram,
Ann Pollard Rowe, and Lynn A. Meisch

Introduction

Ann P. Rowe, Mrill Ingram, and
Lynn A. Meisch

The leaf fibers used in highland Ecuador come from two closely related plants, which nevertheless have divergent histories. One belongs to the genus *Furcraea*, is indigenous to Ecuador, and has likely been used for millennia there, while the other is from the genus *Agave* and was probably introduced from Mexico during the colonial period (figs. 1, 2). Both plants have long fleshy leaves, usually with spiny edges, that emerge from a base low on the ground. Cutting the leaves delays the flowering, or bolting, which also coincides with the plant's death.[1] The flowering plant produces a tall central stem topped with cream-colored flowers. These stalks (*chawarkeros* Q.) are extremely strong and light for their length and are frequently used to make fences and roof beams, as well as for other construction. Dried leaves may also be used in construction or as fuel for fires.

The leaves of some species, including those found in Ecuador, form a soapy lather when crushed and are used for washing clothes, especially wool. The lather is also touted as a clothes whitener and a shampoo, since it is thought to help prevent headaches and to encourage the hair to grow longer. Extracts of the leaves may be used as an aid in indigo dyeing. The end spines of the leaves can be used as needles and weaving picks.

The species of *Furcraea* and *Agave* common in the Ecuadorian Andes are found between 700 and 3,000 meters (2,300–9,840 feet) in elevation but grow best somewhere around 1,700 meters (5,575 feet). Though they grow wild in many areas, they are also often cultivated into lines around crop fields. Although similar in appearance, in processing techniques, and in what they are called, the two do differ in some respects, and indigenous people often use them for distinct purposes. Both are of the family Agaveaceae (formerly classified under Amaryllidaceae). The genera differ in that the flowers of *Furcraea* species are pendulous, while those of *Agave* species are erect.

The genus *Furcraea*, native to tropical and Andean America, includes some fifteen species, of which the one found in Ecuador is usually identified as *Furcraea andina*. The same plant occurs in Peru and is native to the Andean area.[2] Its leaves are a brighter green and are stiffer and narrower than those of the *Agave* species commonly found in Ecuador (fig. 1). The fibers are used to make rope (fig. 3) and sandal soles, as well as coarse woven sacks, and in some areas are also used to make a pre-Hispanic type of looped bag (*shigra* Q.).[3] The flowers are sometimes made into a sweet condiment. The leaves are also traditionally used for soap and shampoo, although modern detergents are now replacing them.

After one to three years of growth, depending on environmental conditions, the leaves reach about 60 centimeters (2 feet) in length and are ready to be cut for fiber. Leaves are usually cut from around the base of the plant. Under ideal conditions, and after about five or six years of steady growth, some thirty leaves, each 90 to 120 centimeters (3–4 feet) long, can be cut from a plant. Repeated years of cutting a plant encourages it to develop a kind of trunk, with the leaves growing off the top. Uncut plants flower (and die) any time after three or four years. Cut plants have been known to continue growing for thirty years and more.

Agave, by contrast, is native to Mexico, where many species, useful for various purposes, were cultivated and continue to be grown.[4] The *Agave* species prevalent in Ecuador is generally identified as *Agave americana* and has fleshy bluish green leaves that are wider than those of

Fig. 3. Ropes for sale, probably made from *Furcraea* fiber (chawar). Those in focus are braided. Saquisilí market, Cotopaxi province. Slide by Sara Laas, 1988.

Furcraea and curve slightly (fig. 2). It takes six to eight years before it is ready to be cut. A variety less common than the dominant one that we saw in Cotopaxi and Tungurahua provinces has yellow stripes on the edges of the leaves and is considered to produce a superior fiber.[5] Another variation, which we saw in Salasaca, lacks teeth on the edges of the leaves.

Currently, *Agave* fiber is preferred for making shigras in Cotopaxi province and is used to tie resists for dyeing in Azuay. The plant is more frequently used as a boundary marker than are *Furcraea* plants. If the bud of the stem is cut out just as the plant is beginning to bolt, a sweet sap (*chawarmishki* Q.) collects in the resulting hole and is used as a sweetener and as a drink for medicinal purposes. The leaves are also fed to animals.

Both plants are grown, processed, and fabricated into goods throughout the Ecuadorian highlands. The most important centers for *Furcraea* growing and processing, however, are in Imbabura and Chimborazo provinces, while Cotopaxi and Tungurahua grow more *Agave* (map 1).

Today there is a profusion of local names for these plants in Ecuador. Both are called *chawar* or *tsawar* in Quichua and *penco* in Spanish (pronounced "pinku" by many Quichua speakers). A related Spanish word, *penca*, refers to a fleshy leaf of such a plant. The *Furcraea* is called *yuraj chawar* or *tsawar* (Q.) or *penco blanco* (S.), *yuraj* and *blanco* both meaning "white," while the *Agave* is called *yana chawar* or *tsawar* (Q.) or *penco negro* (S.), *yana* and *negro* both meaning "black." The tall stem that grows when the plant is mature may be called *palo* (S.), *ojo* (S., eye), or *maguey grande*, which is the Mexican term. The fiber from both plants is called *cabuya* (modified by *blanco* or *negro* to distinguish them), or sometimes *pita* (Q., fine thread), throughout Ecuador. To add to the confusion, sometimes the plants themselves are called *cabuya*. *Cabuya* is a Taino word introduced into Ecuador from the Caribbean by the Spanish, and was current by the 1550s; for example, Pedro de Cieza de León wrote that the fiber was used for sandals.[6]

We were informed by a Salasaca man that the term *pita* also refers to a fiber from the Oriente (the tropical forest area on the eastern side of the Andes), which is used there today to make loosely netted bags. He said that formerly Oriente pita was used in Salasaca (Tungurahua province) to make fine shigras, but that now shigras are made from *Furcraea* fiber, which is considered inferior. Because these *Furcraea* and *Agave* species do not grow in the Oriente, pita from that region probably comes from the leaves of pineapple family bromeliads. In fact, the Shuar do use fibers from a pineapple-like bromeliad they call *wasake* to make netted bags.[7] The term *pita* is also used in other Spanish- and Portuguese-speaking countries for other leaf fibers.

The confusion among these local terms multiplies when the terms for these and related fibers in other areas are considered. An English terminology that would use the same term for


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100
SCALE (Kilometers)
International Boundaries
Provincial Boundaries
Provincial Capitals
Andes Mountains
Pacific Ocean
COLOMBIA
Esmeraldas
Tulcán
ESMERALDAS
CARCHI
Ibarra
IMBABURA
Otavalo
PICHINCHA
Cayambe
Santo Domingo
Quito
NAPO
MANABÍ
ECUADOR
COTOPAXI
Latacunga
Salcedo
Tena
Montecristi
Portoviejo
Jipijapa
Ambato
TUNGURAHUA
Baños
LOS RIOS
BOLIVAR
Guaranda
Riobamba
Puyo
Babahoyo
Cajabamba
PASTAZA
Chillanes
Guamote
GUAYAS
CHIMBORAZO
Febres Cordero
Guayaquil
Alausí
Santa Elena
Chunchi
Macas
CAÑAR
Cañar
MORONA SANTIAGO
Azogues
PACIFIC OCEAN
Cuenca
Gualaceo
PUNÁ ISLAND
AZUAY
Machala
EL ORO
Saraguro
Zaruma
Yacuambi
Loja
Zamora
LOJA
Gonzanamá
Cariamanga
ZAMORA CHINCHIPE
PERU
Equator
SOUTH AMERICA

Map 1.

the same fiber on a worldwide basis would of necessity have to contradict some local usages. Although nothing is really established, it does seem desirable to find a word that, in English at least, could distinguish the *Furcraea* species used in Peru and Ecuador from other *Furcraea* species, for example, *fique* (usually *F. macrophylla*) in Colombia. Because *Furcraea andina* is indigenous to the area, and the classic Inca word for the fiber is *ch'awar*, we propose to Anglicize (and Ecuadorianize) it to *chawar*. For *Agave americana*, which is also used by indigenous people in Mexico, where it originates, one can use the Mexican term *maguey*, probably of Taino origin, also common in English, although in Mexico it may include other *Agave* species as well.[8] The term *maguey* can at least differentiate these *Agave* species from the commercially important sisal (*A. sisalana*) and henequen (*A. fourcroydes*). Since *maguey* may refer to the plant, the fiber may need to be referred to as *maguey fiber*.

Historical references

Ann P. Rowe

In a document written in 1571 or 1572 describing the Riobamba area, the author notes that fibers from a plant called *cabuya*, "which grows naturally in the countryside without cultivation," were used to make ships' rigging (*jarcia*), as well as sandals, ropes, bridles, and halters.[9] He describes the leaves as four fingers wide, which would correspond to *Furcraea*, and says the leaves are cured, and then beaten (*sacudidas*) in the manner of hemp, producing a hemp-like fiber. In addition, he notes that the barbs on the tips of the leaves were used as needles, and that sewing thread was also made of it, "as fine as linen." He also mentions the liquid as a drink.

A report of about the same date for San Andres Xunxi, near Riobamba, also indicates that cabuya was grown in this area and was part of the tribute exacted by the Spanish, who used it for ships' rigging (*xarcia*).[10] Another report of this period (1582) mentions a valley called Chuquipata near Azogues in what is now Cañar province where cabuya was particularly abundant.[11] In Chunchi and Alausí, in what is now southern Chimborazo, the fiber was used for tunics (*camisetas*) as an alternative to cotton.[12]

Bernabé Cobo, writing in 1653, calls both plants *maguey* but describes their differences in sufficient detail as to make it clear which one he means in each case. He describes the *Furcraea* plant as being from Peru but the *Agave* as native to Mexico; he makes no reference to the *Agave* being used in Peru.[13] The inference is that the *Agave* was introduced into South America during the colonial period, at some time after 1653.[14] Cobo calls the *Agave* plant *maguey del vino*, suggesting that the liquid, often made into alcoholic beverages in Mexico, was a major use and distinctive feature of this plant. *Agave americana* is indeed one of the *Agave* species used for *pulque* production in Mexico today.[15] A maguey plant is depicted in the foreground of a painting of Mount Chimborazo in a book by Alexander von Humboldt,[16] who traveled in South America between 1799 and 1804; thus, its introduction dates to before this time.

Processing

Ann P. Rowe

Although household processing of these leaf fibers occurs, the majority appears to have a commercial basis, partly recent but partly of long standing. The following sections examine not only such processing techniques as we were able to record but also describe how these commercialization networks are organized.

There are numerous different methods of separating either chawar or maguey fibers from the surrounding pulp. One method is primarily mechanical: the leaves are crushed by machines or scraped by hand (Imbabura province). Another method is partly biochemical: the leaves are shredded and then soaked in still water for eight to fifteen days until the pulp is rotted, a process called retting (Cotopaxi and Chimborazo provinces). Subsequently, the fibers are washed and beaten to remove the remaining pulp, then dried, after which they must be further separated before they are ready for use. There are various ways of shredding the leaves to begin with and of separating the fibers after drying.

Many of the methods used in Ecuador probably have considerable antiquity, although some were probably introduced in the colonial period, for example, the use of metal spikes, and some mechanical methods are obviously modern. Very little has been recorded about the processing of these fibers in Peru, but the method Daniel Gade reports for chawar in the Cuzco area is unlike what we found in Ecuador.[17] The split leaf is drawn through a pair of wooden sticks that have been tied together at one end in order to scrape off the pulp. Although this comparison suggests

that the Incas probably did not significantly influence techniques in Ecuador, it would not be surprising if there was Spanish influence since, as noted, chawar and maguey fiber processing was a major industry in Ecuador during the colonial period.

These long fibers can be twisted into thread simply by rolling them between the hands, which is the technique used for making rope and looped bags. To prepare thread for weaving, however, and sometimes for other purposes, the fiber is spun with a spindle, similar to spinning cotton and wool.[18]

Shigra Making in Cotopaxi

Laura M. Miller

Although shigras are also made in portions of Tungurahua, Bolivar, and Chimborazo provinces, primarily for local use, they are most visible in Cotopaxi province because during the 1980s many women were making them for sale to tourists. The fiber processing for shigras is usually done by women who specialize in it and sell the fiber in the various local markets. Other women buy the fibers and make the shigras, often for a wholesaler.

According to Nobuko Kajitani, who visited Ecuador in 1963, few shigras were in evidence in Cotopaxi province at that time.[19] It was only later in the 1960s and 1970s that shigras were marketed to tourists, causing an increase in the number of shigra makers and in the importance of the intermediary. Shigras are made in the rural communities around Salcedo, both east and west of town, including Collana, Cusubamba, Salache, Quilajaló, Pilaló de San Andrés, Papaurcu, Barbapamba, Sigchoscalle, and Santa Ana.[20] Earthwatch teams collected information on shigra making in Pilaló and Papaurcu in 1988.[21]

Commercialization networks

In general, women make shigras, although we met some older male shigra makers. Given the small parcels of land in Cotopaxi province, often less than 1,000 square meters (1,196 square yards),[22] many men seek paid labor in the large towns, in construction, petty commerce, and as stevedores. Agricultural labor is done by women, who also make shigras for cash when agricultural tasks are not urgent—after harvest and before planting. Women work on shigras as they walk to the fields or watch their animals. Since shigras are time-consuming to make, the profit is not very great, but since women are using time that would otherwise be wasted, it is worthwhile for them.

Women purchase raw materials for shigras in local markets.[23] They usually buy small quantities of the many colors they need. Since it can take months to make a shigra, often the artisans do not recall how much material entered each finished product. In other cases, intermediaries who purchase the finished shigras supply the material. Our research group visited one such intermediary family in Pilaló de San Andrés, who had a large number of shigras in storage. The wife (Rosa Caizatasi) dyed large quantities of fiber, and the husband (Pedro Caizaguano) owned a pickup truck, which he used to take finished shigras to other markets, and probably to visit rural shigra makers, selling raw materials and picking up finished products. In one village visited in 1988, we were told that there were very few shigras left because the wholesaler had just picked up his order.

Intermediaries often order the size, design, and quality, but do not set the price for the finished shigra until the piece is done.[24] The price depends on the quality of the work, the state of the market, and on the personal relationship between the shigra maker and the buyer.

Since shigra making is one activity among many for rural women, it is difficult for them to estimate the labor required for a particular shigra. One woman, however, said she needed up to six months to make a large, fine shigra, but only two days for a coarse medium-sized shigra. A small, fine shigra or a medium-sized shigra with thicker thread can require approximately a week or ten days.[25]

According to Mary Weismantel there were two principal kinds of shigra sellers in the 1980s.[26] One group consists of Otavalo men (from Imbabura province) who sell to tourists in the Cotopaxi markets. They have money to invest and a big inventory of fine-quality new shigras. They also buy older shigras, which, though in good condition, are faded. They dye these in bright colors, pink or turquoise, prior to sale. The other group consists of women within Cotopaxi and Chimborazo provinces who are involved in the shigra market as an adjunct to the rope business. They sell a variety of non-wool textile products: feed sacks woven out of recycled plastic, braided ropes made out of plastic and chawar, shigras, and bulk fiber for shigra

Fig. 4. The woman at left has tied a traditionally patterned shigra to her waist, as she would for sowing seed. The man at right holds a shigra of contemporary design. Papaurcu, Cotopaxi province. Slide by Ann Pollard Rowe, 1988.

making, dyed and undyed. Many of their shigras are not very fine—strictly utilitarian—but they often have some nice ones. Initially, in the early 1980s, they were not used to the tourist trade, but by the late 1980s, some were pursuing tourists quite aggressively. Local men sell rope too, often combined with articles made out of used tires; but they never sell anything to do with shigras.

During the 1980s vendors from Cotopaxi province filled several kiosks in the Saturday Otavalo market with shigras and some Rumipamba warp-resist dyed shawls. Shigras are available not only at regional markets, but also in stores such as OCEPA, in Quito, Guayaquil, and Cuenca, which are national craft outlets.

Uses of the shigra

Shigras have many traditional uses, although these are waning due to the advent of plastic and metal household products to Ecuador's rural areas. Shigras were used to carry jugs of water, and as storage for harvested goods, such as maize and potatoes. They were also used for sowing seeds; the shigra containing seeds was tied at the waist or neck and then seeds were broadcast into the plowed fields by hand (fig. 4). In addition, shigras continue to be used in markets as containers for spices and other small products (fig. 5). Some older women and men wear shigras on their backs for carrying goods to and from market.[27]

For the tourist trade, people who manage fine artisan stores in Quito add a leather portion to the shigra opening, and lace a drawstring through it, thus adapting the shigra to urban use as a pocketbook. In addition, Ecuadorian schoolgirls and women university students have been using shigras as shoulder bags for their notebooks and papers.

Fiber processing

In Cotopaxi, maguey fiber is considered superior to chawar for making shigras because the fibers are whiter and softer and take dyes better. Lorenzo Zangucho of Salache described the processing of maguey fiber in that community.[28] When the plant is mature (with its flowering stem), which he said was in six to eight years, the inner leaves are cut from the center near the base with a knife or machete. People use the outer leaves as fuel for fires. The sharp point and the spikes on the outer side edges of the leaves are cut off. Then the leaf is shredded using a piece of wood with a nail in it (*alacina*). A more modern method (observed by Mary Weismantel) is to throw the cut leaves onto the highway so that cars run over them for two days; this process breaks down the leaves and dries them out somewhat at the same time.

The shredded leaves are placed in a pool of water such as an irrigation ditch or a deep puddle. In Rumipamba (northeast of Salcedo), Mary Weismantel saw leaves being retted in a series of square shallow pools, about one meter (3 feet) across, that had been filled by partially diverting a stream (fig. 6). The leaves soak for about fifteen days, until the pulp and skin rot. The leaves are checked periodically because if they soak too long, the fiber will also begin to decay and become useless. The leaves are then washed in

the river and beaten against rocks to remove the remaining pulp. The clean fibers are hung out to dry in the sun, which usually takes about a day. When dry, the fibers are separated—pulled apart by hand—after which they are ready for twisting. It takes about six leaves to make a small shigra.

Some of the fibers are dyed with synthetic dyes, purchased in the markets of Latacunga, Salcedo, Pujilí (west of Latacunga), and Saquisilí (northwest of Latacunga). Most shigra makers do not have the capital to purchase large quantities of fiber or dyes. Instead, the shigra wholesalers dye the fiber and apportion it to the women who work for them.[29] Shigra makers also buy the fiber in small hanks, called *shuñawi* (Q.), in the local markets. The dyed fiber costs about twice as much as undyed. In June 1988, a hank of dyed maguey fiber sold for 50 sucres ($.10), whereas undyed fibers sold for 30 sucres ($.06).

To dye maguey fibers, water is brought to a boil, and then salt, lemon juice, and synthetic dye powder are added. The white fiber is added and allowed to simmer in the dye bath for an hour. The fibers are not rinsed, but are simply taken from the dye bath and left to dry in the sun.

Fig. 5. Shigras used to hold small food products in the market. Note also the gourd cup used for money, the baskets used for larger goods, and the wooden spoons. Pujilí market, Cotopaxi province. Slide by William H. Holmes, 1988.

Twisting and looping the thread

The artisan begins a shigra by twisting together enough fiber to make a strand the desired thickness. The quality of the shigra depends on thread size. For a fine shigra, some five fibers are twisted together, making a thread the size of embroidery floss. For a thicker shigra, some thirty fibers might be twisted together, making a thread approximately the weight of heavy packing string.

Because the looping technique used for shigras involves pulling the entire length of the thread through the fabric for each stitch, it is not practical to spin all the thread for a shigra in advance. Instead, the thread is made as the work proceeds, about a meter (3 feet) at a time, with new fibers added to prevent the working length from becoming too short.

The process was demonstrated for us by María Pullatasis, of Quizapincha, Tungurahua province (west of Ambato).[30] After selecting the desired number of fibers to begin a shigra, the artisan twists the extended length of the fibers slightly, between her fingers, holding one end of the yarn in each hand. The direction of the twist in the yarn corresponds to the slant of the central part of the letter Z. Then she goes back and twists the yarn again in the same direction with her

Fig.6. Retting pools for maguey leaves. Salache San José, Cotopaxi province. Slide by Mary J. Weismantel, 1982.

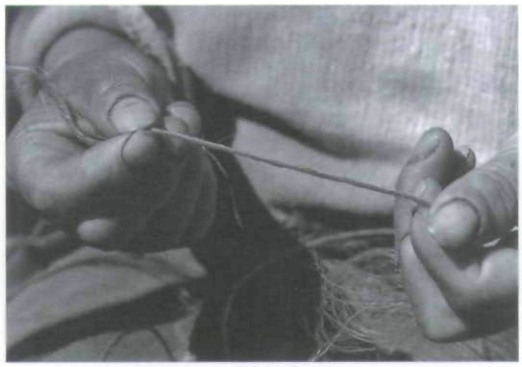


Fig.7. Twisting maguey fiber for a shigra. María Pullatasis, Quizapincha, Tungurahua province. Slide by Betty Davenport, 1988.

Fig. 8. Setting the spin of maguey fiber thread for shigra making. María Pullatasis, Quizapincha, Tungurahua province. Slide by Betty Davenport, 1988.

Fig. 9. Inserting the needle for shigra making. María Pullatasis, Quizapincha, Tungurahua province. Slide by Betty Davenport, 1988.

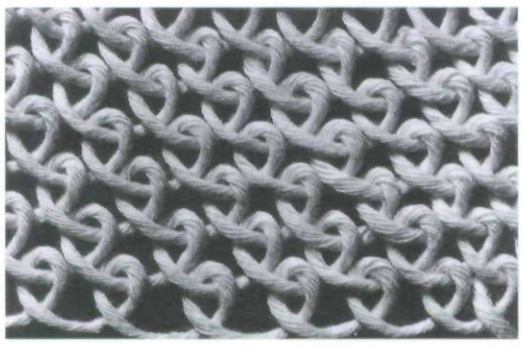


Fig. 10. Diagrammatic construction of simple looping, the structure found in Ecuadorian shigras. In this construction both the plying twist and the crossing of the loops correspond to the slant of the center of the letter S. From Emery 1980, fig. 9.

right hand in increments of 8 to 10 centimeters (3–4 inches) (fig. 7). She first splays the fibers and then smoothes them between her thumb and forefinger to remove irregularities. After twisting each section, she wraps it around two fingers of her left hand to set the spin (fig. 8).

Shigras are started at the center of the base. The artisan ties an overhand knot in one end of the thread, which is not pulled completely closed. She threads a needle by folding the fibers on the other end of the yarn over the tip of the needle and pushing the resulting loop through the eye. She pulls a section of yarn about 13 to 15 centimeters (5–6 inches) long through the eye, and the tail is blended and twisted into the length of the main strand. She makes seven simple loops (buttonhole stitches) over the thread of the initial overhand knot to form the first row of the shigra. The tail of the overhand knot is caught into this first row of stitches. She breaks off any remaining tail with her fingers.

The looping proceeds in a continuous spiral. When looping, the artisan always inserts the needle into the space between loops in the preceding row with the point toward her (figs. 9, 10). The stitch crosses in the opposite direction (corresponding to the slant in the center of the letter S) to the twist of the fibers, so that the twist is tightened rather than loosened by the work. The artisan holds the work flat between the first and second fingers of her left hand. To keep the base flat, increases are made as necessary, making two stitches instead of one in the same space. When only 30 centimeters (12 inches) or so of the working strand remains, she adds more fiber into the end. She gives the fibers a first, rough twist, and then adds them to the working strand before beginning the tighter twist and smoothing process described above.

To make a pattern of horizontal stripes, the artisan simply splices in fibers of a new color in the same way the addition of fibers is described above, and continues the spiral. More complex patterning, such as is found in Cotopaxi, breaks up the spiral working pattern, since the artisan works back and forth with each color in a single color area. By turning the piece over to work alternate rows, she does not have to reverse the looping stitch in order to have each row structurally identical. A common way of working with multiple colors is to work back and forth a few rows in one color and then to add a new one; or the entire color block may be completed before starting the next area. At the joins, the needle is put through the turn of the first color, so that no

slits form in the fabric. While being made, a shigra will have a thread hanging down from each color area waiting to be worked.

The base of the shigra, essentially a flat circle, is called the *asiento* (S., seat) or *rabuñan* (Q., path of the tail). When the base diameter is sufficient, the artisan stops adding loops and simply puts one loop in each space between the loops of the preceding row. This portion, the start of the shigra wall, is called the *pata de ollamanga* (S., foot of the pot's wall).

The shigra may be finished with a single color row on the upper edge to strengthen it. This portion is called the *cumba*. Then four three-strand braid handles (*shigra watu* Q.) are sewn on, evenly spaced around the rim, either by the wholesaler or by the artisan. In a wholesaler's family we met, one daughter dedicated herself to braiding these straps and could make one hundred in a day. For fine shigras, an attempt is made to match the color of the braids with that of the shigra itself, but for lesser quality work, any color of braid is sewn on. When making braids, the braider holds one end of the strap in her teeth, using her hands to make the braid.

Young girls begin to make shigras around the age of seven, and when they reach adolescence, they begin to work on increasingly complex designs. All designs are done from memory.

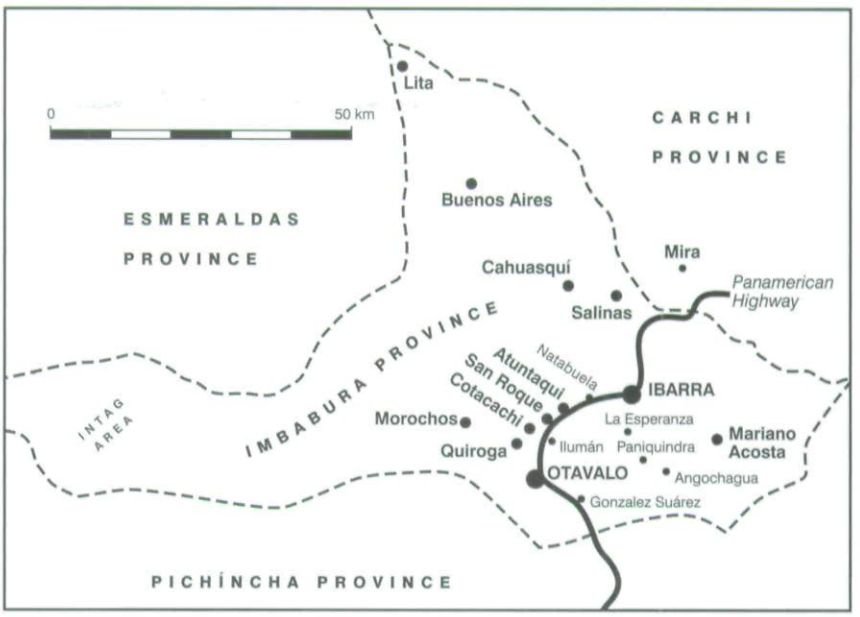
Older shigras from the area west of Salcedo have simple horizontal stripe patterns. Those from Papaurcu east of Salcedo have geometric designs in horizontal bands on the wall portion (fig. 4). Most of these designs have both Quichua and Spanish names, such as *pata de llamingo* (S., llama foot), *rombo* (S., diamond), *yakukingo* (Q., zigzaging water) and *topikingo, ñajcha*, or *peine* (Q. or S., comb), and *ladrillo* (S., brick). Wholesalers have encouraged the use of new designs, including both geometric and figural motifs.

Shigras made to the west of Salcedo tend to be made of brightly colored fibers, with green, yellow, pink, and orange.[31] Shigras from east of Salcedo have colors such as red, black, natural, and brown.

Furcraea Cultivation and Processing in Imbabura

Mrill Ingram

Chawar production has been important in central Imbabura province for centuries, providing fiber for sandals, rope, cloth, bags, and other items. The principal growing area is around Morochos, and the major processing areas are around San Roque and Quiroga (map 2).[32] Beginning in the 1970s, the area on the western slopes known as Intag, which is lower in elevation and wetter than the area around Otavalo, has also been developed as a major growing area.[33] The plant is also grown in the northwestern corner of the province, in the Lita and Buenos Aires areas, and processing is done in Cahuasquí.[34]



Map 2.

Much of this fiber production seems to be geared toward the weaving of plain fabric for sacks used in exporting coffee and cacao. Natural fiber sacks are required instead of plastic ones by U.S. Customs because they breathe, resist high temperatures, are easier to print lettering on, do not slide off each other when stacked, are easier to inspect, and do not rip when moved around by hooks.[35] Such sacks are also used to ship agricultural produce within the country.

The Intag area

Farmers in Chimborazo province tell of selling bulbils from their plants to farmers from Intag who wanted to start producing chawar in the 1970s. A bulbil (bulblet) is essentially a miniature plant that forms on the flowering stalk; it is a clone of the parent plant and roots when in contact with soil. In the Intag area, bulbils are planted in single and double lines around fields of other crops such as beans, maize, plantains, papayas, guavas, and even sugar cane. The

plants grow very large, perhaps in response to the richer soils and additional moisture of these lower areas, and tend to have longer leaves than those grown elsewhere.

The chawar grown and machine-processed in Intag, besides being longer, is also whiter but coarser than fiber produced by hand in other places. The coarseness may be due to machine processing. Some people who work with the fiber say that the fiber grown in the more humid environment around Intag is weaker than fiber from plants grown in the more arid environments in Chimborazo province. Because of its length and whiteness, however, and the fact that it is relatively free from remaining bits of leaf or other debris often left after hand processing, the Intag fiber is preferred for many uses. Spinners especially prefer this cleaner fiber.

To harvest the fiber, workers use a knife to cut off the leaves around the lower perimeter of the plant. Only one-half to two-thirds of a plant's leaves are harvested at one time, which allows the plant to continue to grow and delays the bolting, or flowering, of the plant. In the Intag area, the fiber is extracted by machines that have two notched wheels turning in toward each other, much like an old-fashioned wringer on a washing machine. The leaves are held by their base and fed into the turning wheels, which mash up the flesh of the leaf, so only fibers remain attached to the base. Jaramillo reports that the fiber is then washed, although I did not learn about this step in Intag.[36]

The fibers are laid out to dry in the sun so that mold does not grow on them during shipping. After drying, they are loosely sewn together so they hang in curtains; they are then rolled up into one-quintal bundles (100 kilograms or 225 pounds) and trucked to markets all over the country.

Fiber extraction by hand

Ann P. Rowe

Although machine extraction is now used for leaves processed in quantity, hand tools are sometimes used for small quantities in Otavalo and Atuntaqui, as well as in Intag. Two types of hand tools used in Imbabura have been recorded by Jaramillo.[37] One tool is made from the shoulder blade of a cow, with a cutting edge on one side. Two lengthwise cuts are made in the leaf. The person works seated and holds the bone with his feet. With his hands he presses each strip of leaf against the cutting edge of the bone and slides it along. When the edge of the bone becomes dull, he sharpens it with a knife and grit.

A fancier tool, called a *raspador* (S., scraper), a drawknife in English, is made of a length of wood with a handle on each end and a sharp knife blade attached to the center, usually made from an old machete. The leaf is suspended from the belt of the worker and rests against a slightly convex board, wider at the top than at the bottom and with flanges at the top. First, the upper half of the leaf is scraped, and then the free fibers are wound around the handle of the board while the other half of the leaf is scraped. This technique is similar to that used for maguey by Otomí people in the valley of Mexico.[38]

Obviously the use of these tools involves substantial physical effort and is time-consuming. A yield of fifty pounds (22.5 kilos) of fiber in one day is considered excellent, while a machine can process ten times this amount in a single day.

San Roque

Lynn A. Meisch

We observed a family, Rosa Amada Sirrinta and Modesto Larrea, who weave fabric from chawar on the treadle loom, which they send to Guayaquil to be sewn into food sacks.[39] The fiber had already been extracted from the leaves and dried. It is laid on the ground outside the house and rubbed by hand with a large disk of beeswax (fig. 11).

Then it is "carded" by one of the men, using a stationary, wooden, waist-high device (*escarmenador* S.) made with two heavy slabs of wood for the legs and a slab covered with nails on top (fig. 12). The man repeatedly flings the fiber over the board of nails and pulls it back through with strength (a process more like hackling flax than carding wool). The man in figure 12 wears a cloth tied over his nose and mouth to avoid breathing the fiber. The coarser, shorter fibers (*grueso* S., or *chamba*),[40] which remain on the nails, are put in one corner for use as weft. The finer, longer fibers (*hilo* S.), left in his hand, about 90 to 120 centimeters (3–4 feet) long, are placed in another corner for use as warp (fig. 13). The fiber, either coarse or fine, is wrapped around a distaff, a pole 1.8 to 3.0 meters (6–10 feet) tall. Two shorter distaffs contained coarse fiber for the weft, while a taller one had fine warp fiber (fig. 14).

This family uses small electric spinning machines made from motors with a drive belt and spindle attached (fig. 15). The spinners (we photographed both a man and a woman) can use

Fig. 11. Rubbing chawar with beeswax. San Roque, Imbabura province. Slide by Gayle Bauer, 1989.

Fig. 12. Hackling chawar. Morales Chupa, outside of Quiroga, Imbabura province. Slide by Mrill Ingram, 1990.

Fig. 13. Man holding hackled and unhackled chawar. San Roque, Imbabura province. Slide by Gayle Bauer, 1989.

Fig. 14. Distaff with fine chawar to be spun for warp. San Roque, Imbabura province. Slide by Gayle Bauer, 1989.

Fig. 15. Spinning chawar using an electric wheel. San Roque, Imbabura province. Slide by Patt Hill, 1989.

both hands to draft the fiber because the right hand is not needed to rotate the spindle. When a large cone of spun thread builds up on the spindle, it is removed and set aside for weaving.

Some chawar weaving yarn is also still spun by women using a pampas grass spindle (*sigse*), held horizontally to produce an S-twist.[41]

Furcraea in Chimborazo

Mrill Ingram

Commercialization networks

The Plaza Dávalos in Riobamba on Saturdays (market day) has long served as the focus of chawar trade in south-central Ecuador (fig. 16). One can still find chawar grown and hand processed in the Riobamba area at the market. However, a disease from a scale insect (*Pseudoparlaleria diaspidida*) has wiped out large areas of the plants grown in Chimborazo

Fig. 16. The chawar market at the Plaza Dávalos, Riobamba, Chimborazo province. Slide by Mrill Ingram, 1990.

beginning in 1987; and the expanded planting and mechanization in the north has shifted the focus of chawar production from Chimborazo to Imbabura province. Much of the raw, or unspun, and unwoven fiber found in Plaza Dávalos is therefore trucked in from Imbabura.

Riobamba remains an important center for the production of chawar products, however, and the market offers many different types of rope, spun thread, woven sacks, saddlebags, and hammocks. The availability of skilled and inexpensive hand labor in the area may account for the presence of almost every stage of chawar production in Plaza Dávalos.

The machine-processed fiber from Imbabura changes hands several times, beginning with the farmer who grows it in Imbabura. A businessman buys the quintals from several farmers, and trucks them southward to pile them into a storehouse near Plaza Dávalos in Riobamba until market day. On market day, the storehouse is flooded with mestizo market women, who buy up the quintals, often with money extended to them by the same businessman. The market women take the bundles out to the plaza and divide each quintal into some thirty smaller bundles. They resell the smaller bundles, primarily to indigenous women living south of Riobamba who take it home to spin into warp, with an S-twist (fig. 17). The women return to the market to sell their spun skeins to weavers from the Guano area who use it to weave cloth for food sacks.[42] The thicker weft thread for these sacks is spun in the Guano area from locally grown and hand-processed fiber (with a Z-twist).

Fig. 17. Spinning chawar for warp. Pataño, outside of Licto, Chimborazo province. Slide by Mrill Ingram, 1990.

Fiber cultivation and processing

The main growing area near Riobamba is northwest of the city, near the town of Guano, which lies along the Guano River, an area inhabited mainly by mestizos. In the hills above the river, the soil is sandy and dry. The *Furcraea* plants and eucalyptus trees dominate the landscape. Because the land here is poor, there is little competition for space from other crops, and *Furcraea* plants are scattered rather haphazardly.

Most people own their own land, on average about 1.5 hectares (3.7 acres). This area has also seen extreme outward migration, so the people remaining are generally older couples, single women, and migrant laborers looking for a bit of work to tide them over. A number of processors are absentee landowners who visit once every six months to harvest the plants or who hire someone else to do it. Since *Furcraea* growing and processing does not have a high economic return, most people use it as an income supplement, not a sole source of support.

Bulbils from the flower stalks are removed and planted in protected areas until they grow large enough to survive nibbling by livestock, at which time they are replanted in fields. Some farmers have had luck fighting the recent disease by applying hot ash to the base of their plants.

The leaves are cut from around the bottom half of the plant, leaving at least a third of the top leaves so the plant can continue to produce. The leaves are stripped of their spiny edges and then cut lengthwise into about thirty thin strips (fig. 18). The usual method is for a person to stand on the tip of the leaf and split it with a knife. The person then turns the leaf around to finish splitting the other end. The strips are fanned out into circles and left in the sun for one to two days (fig. 19). Leaves are also sometimes thrown onto the paved highway that runs from Riobamba toward Baños, so that passing cars mash them and begin removing much of the plant flesh. The slippery leaves have caused car accidents, however, so if road workers see leaves they will stop and throw them off to the side.

Fig. 18. Boy splitting a *Furcraea* leaf with a knife. Outside Guano, Chimborazo province. Slide by Mrill Ingram, 1990.

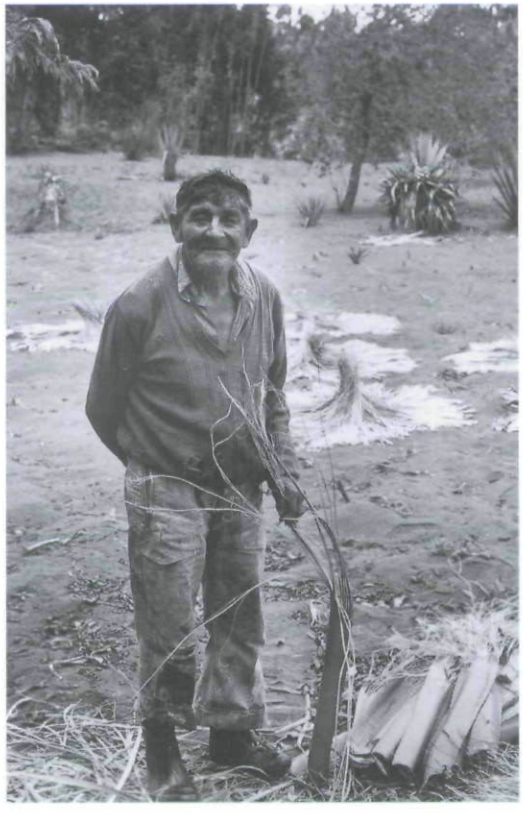


Fig. 19. Man with split *Furcraea* leaves and fan shapes of split leaves in the background. Outside Guano, Chimborazo province. Slide by Mrill Ingram, 1990.

After drying, these strips are ready for soaking to remove the plant flesh. The leaves are tied into loose bundles and put into still pools, many of which are dug expressly for this purpose in the boggy areas near the Chambo River and the wetland area called Los Elenes along the Guano River (fig. 20). Some people with access to plants but lacking water for processing, will just cut the leaves, dry them, and then sell the dried strips (*cabuya verde* S.) in the market to someone else who will soak them and finish the hand processing.

After eight to fifteen days of soaking, much of the leaf flesh has rotted away. The fiber bundles are then beaten furiously against rocks in the river, or with wooden mallets, to rid them of remaining bits of leaf (figs. 21, 22). The fibers are then spread to dry in the sun for a day or two.

The hand-processed chawar from around Riobamba (*cabuya podrida* S.) is softer, more pliant, and (some say) stronger than the machine-processed fiber from Imbabura. It does contain small bits of leaf and other debris, however, which appears to make it less popular with spinners of finer threads. It is often used to make rope. The hand-processed fibers are generally teased by hand, simply pulled apart using the fingers so that very little fiber is lost. This reluctance to waste any fiber may be due to the fact that hand processing is so laborious. The fiber is then ready to be spun into weft for sacks using a vertical spindle in a manner similar to cotton or wool or to be made into rope.

Although the making of shigras using a looping technique similar to that described for Cotopaxi is now done only by some old women in Chimborazo, the usual fiber here is chawar rather than maguey. In Chimborazo province, maguey is used chiefly for the sweet sap and for animal fodder.

Techniques of rope making

Bundles of the fiber are separated into two and the ends are held between knees or toes, or sat upon by a child. The other ends of the small bundles are then individually rolled rapidly between the palms, beginning close to the held ends and moving outwards. Once the entire length has been twisted, they are then rolled between the palms in the opposite direction so that the two lengths twist around each other. A third bundle can also be added in to make a three-ply rope. The fiber may also be divided into three and braided together instead of twisted.

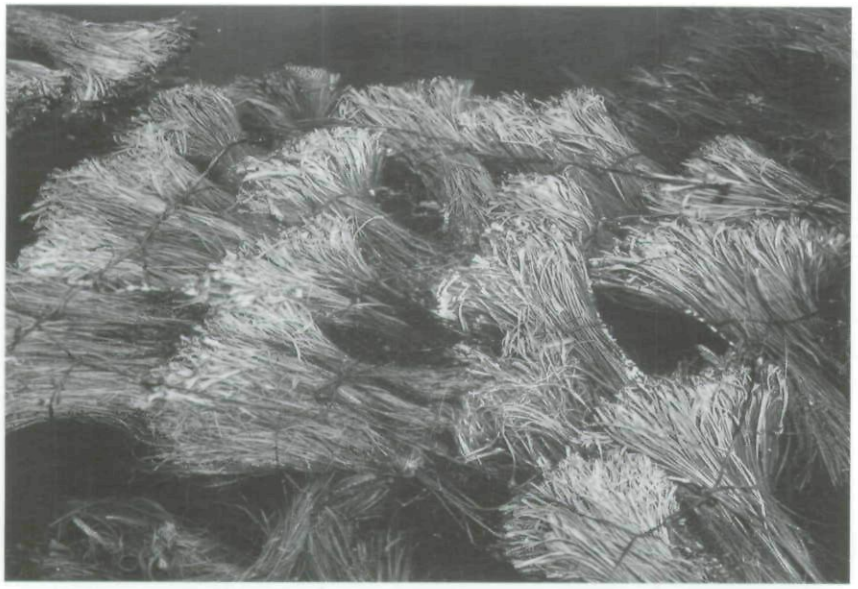


Fig. 20. Retting *Furcraea* leaves. Los Elenes, Chimborazo province. Slide by Mrill Ingram, 1990.

Fig. 21. Beating *Furcraea* leaves against the rocks after retting. Los Elenes, Chimborazo province. Slide by Mrill Ingram, 1990.

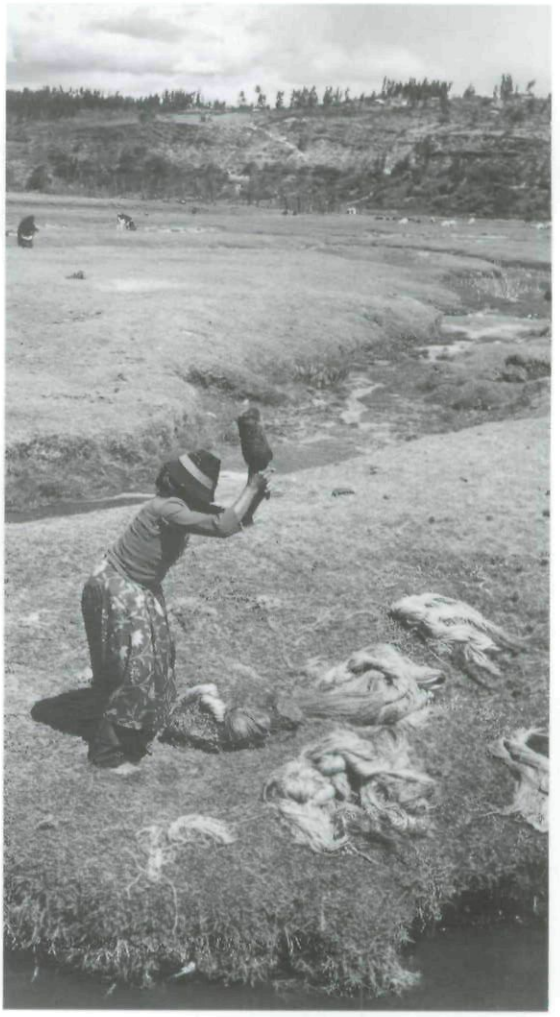


Fig. 22. Beating *Furcraea* leaves with a wooden mallet after retting. Los Elenes, Chimborazo province. Slide by Mrill Ingram, 1990.

Sandal making in Cubijíes

Ann P. Rowe

An Earthwatch team visited two mestizo families who make sandals (*alpargatas*) for sale in Cubijíes in northern Chimborazo province (east of Riobamba).[43] Lucrecia Samaniego told us she had learned the techniques from her parents some seventy years ago. She and her two daughters, Ana Negrete Samaniego and Melida Negrete, make five dozen pairs each week that they sell in the Riobamba market at La Concepción. Concha Chavez and Segundo Chavez make four dozen pairs in two days.

Fig. 23. Washing and beating chawar. Cubijíes, Chimborazo province. Slide by Jacquelyn Engle, 1989.

Fig. 24. Braiding chawar for sandal soles. Cubijíes, Chimborazo province. Slide by Jacquelyn Engle, 1989.

The fiber comes from Ibarra and is probably chawar. One of the women was soaking and beating the fiber in a large cement double sink filled with water (fig. 23). The fiber had already been partially processed and was grouped into bundles about 2.5 centimeters (1 inch) thick. The woman was alternately swishing the fiber in the soapy water, then laying it on an anvil in the sink and beating it with a heavy wooden stick. This process is continued for two days.

Groups of fiber are then braided in a simple three-strand braid, forming long strips for the soles of the sandals (fig. 24). The sole (*plantilla* S.) is made by coiling the braid on edge into the shape of a foot, held together by a tie around the instep (fig. 25). The coils are then sewn together with a cabuya thread. The needle (*agujón* S.) used is 40 centimeters (almost 16 inches) long, with a metal point and a wooden handle. The point is periodically greased to make it easier to push it through. The needle is pushed through the braids from what will be the side of the sole. Beginning at the heel, the needle is inserted, threaded, and pulled back, drawing the thread through the sole. Still threaded, it is inserted again a little to one side. Before being pulled back again, the other end of the thread is put through the loop at the tip of the needle, to secure it. While the needle is inserted only part way across the heel, it is inserted crossways all across the rest of the sole.

To make the toe covers (*manta* S.), a narrow band of cotton (*chillo* Q.) fabric 10 centimeters (4 inches) wide is woven in plain weave on the backstrap loom. The loom includes a pair of cross sticks (*cruzera* S.) as well as a shed rod and a heddle rod. The finished band is marked for cutting on the diagonal into a series of trapezoidal shapes and then embroidered with various simple designs. The heel straps (*talonero* S.) are woven in a similar manner.

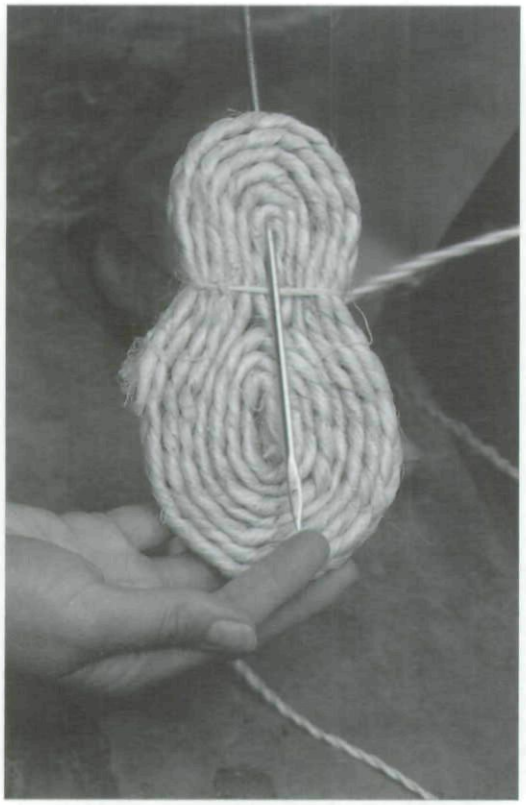


Fig. 25. Sandal sole prepared for sewing. Cubijíes, Chimborazo province. Slide by Jacquelyn Engle, 1989.

Notes

1. The information on the growing of *Furcraea* and some of its uses is by Mrill Ingram.

2. Yacovleff and Herrera 1934, p. 268; Towle 1961, pp. 32–33; Gade 1975, pp. 147–48. According to Herrera and Gade, the word for the *Furcraea andina* plant used in the Cuzco area today is *pakpa*, a term that does not seem to occur in the early sources, although González Holguín (1608; 1952, vol. I, p. 271) gives *ppacpani as* "to hackle" (*rastrillar*) cabuya, and *ppacpana* as a mallet or hackle. His term for the plant is *chuchao* (1952, vol. I, p. 118), and *chahuar* (*ch'awar*) for the leaf or the fiber (1952, vol. I, p. 92), a usage also found in Garcilaso (1609, lib. 8, cap. XIII; 1945, t. II, pp. 183–84) citing Blas Valera. Both *ch'auwar* and *pakkpa* occur in Lira's (n.d., pp. 55, 264) dictionary of contemporary Cuzco usage, translated as "cabuya." *Chuchau* is mentioned under *pakkpa* but not alphabetically listed.

3. The term *sikra*, defined as "*cestilla esportilla*" (small basket), is included in González Holguín's 1608 Inca dictionary (1952, vol. I, p. 326).

4. Gentry 1982.

5. Gentry (1982, p. 281) describes such a plant, identifying it as variety *marginata*, but he does not illustrate it.

6. Cieza de León 1553, la parte, cap. xli, fol. 60; 1984, p. 132.

7. Bianchi 1982, p. 55.

8. See Parsons and Parsons 1990, p. 2.

9. Salazar de Villasante 1881, p. 17; 1965, p. 130.

10. Paz Maldonado 1897, pp. 149–50; 1965, p. 261.

11. Gallegos 1897, p. 174, para. 19.

12. Gaviria 1897, p. 190; Italiano 1897, p. 193.

13. Cobo lib. 5, cap. XX–XXI; 1956, vol. 91, pp. 211–13.

14. Yacovleff and Herrera 1934, p. 268.

15. Gentry 1982, p. 14.

16. Humboldt 1810, plate 25.

17. Gade 1975, pp. 147–48.

18. See Meisch, Miller, and Rowe, Spinning in Highland Ecuador, in this volume.

19. Personal communication, 1996.

20. Meier and Pita 1985, p. 166.

21. Earthwatch team members who went to Pilaló were Darby Raiser, Stephanie Burns, and Ellen Hanley, with Breenan Conterón also contributing a report. The team to Papaurcu consisted of Sara Laas, Stephanie Burns, Marjorie Klockars, and Bonnie O'Connor.

22. Meier and Pita 1985, p. 166.

23. Markarian 1984; Meier and Pita 1985.

24. Meier and Pita 1985, p. 166.

25. Meier and Pita 1985, p. 167.

26. Personal communication, 1993.

27. Rowe ed. 1998, p. 121, fig. 109.

28. The interview was conducted by María Aguí for the Earthwatch project July 8, 1988. Some additional information was provided by Mary Weismantel, recorded in 1984 in the area of Rumipamba. See also Markarian 1984, p. 14 and Jaramillo 1988, pp. 39–40.

29. Meier and Pita 1985, p. 166.

30. This description is based mainly on notes by Earthwatch volunteer Betty Davenport (a weaver herself), July 5, 1988. The team to Quizapincha was led by Breenan Conterón, with Dayna Elfont and Adelle Pollock assisting.

31. Rowe ed. 1998, p. viii.

32. Jaramillo 1992, p. 68.

33. Fieldwork was carried out in both Imbabura and Chimborazo in the summer of 1990. See also Ingram ms.

34. Jaramillo 1992, p. 68.

35. Zamosc 1981, p. 30.

36. Jaramillo 1992, p. 73.

37. Jaramillo 1992, pp. 69–70.

38. Parsons and Parsons 1990, pp. 148–56.

39. Earthwatch Team report for July 6, 1989, led by Leslie Grace, with Nancy Fleming, Bettye Dennison, and Gayle Bauer. Slides taken by Patt Hill on June 28.

40. The term *chamba* is from Jaramillo 1992, p. 73.

41. Jaramillo 1992, pp. 74–75; see also Meisch, Miller, and Rowe, Spinning in Highland Ecuador, in this volume.

42. See Rowe ed. ms., chapter 8.

43. The Earthwatch team to Cubijíes was led by Julio Chérrez S., accompanied by volunteers Kirby Hall, Jacquelyn Engle, and Patricia Meloy.

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